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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,791	12/01/2003	Michael B. Korzenski	020732-100.686	1912
24239	7590	12/21/2007	EXAMINER	
MOORE & VAN ALLEN PLLC			ANGADI, MAKI A	
P.O. BOX 13706			ART UNIT	
Research Triangle Park, NC 27709			PAPER NUMBER	
			1792	
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			12/21/2007	
			PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/724,791	Applicant(s) KORZENSKI ET AL.	
	Examiner Maki A. Angadi	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,6,7,9,11-14,17,39,41 and 42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,6,7,9,11-14,17,39,41 and 42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/15/2007 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1, 5, 7, 9, 14 and 39, 41-42 are rejected under 35 U.S.C. 103(a) over Seghal (US Pub. No. 2004/0050406).

As to claims 1 and 9, Seghal discloses a composition for removing photoresist from a semiconductor substrate. The composition includes supercritical CO₂ and co-solvents such as branched C₁-C₆ alcohol (e.g. methanol, ethanol or isopropyl alcohol) (paragraphs 0017, 0023, 0029). Other ingredients may be blended into the co-solvent mixture, which includes surfactants. Seghal teaches the surfactant may be non-ionic (0060). Seghal also teaches that an aqueous fluoride such as ammonium bifluoride may be added to the co-solvent mixture (0048).

Since Seghal's composition comprises the same chemical components as claimed by the applicants, then using Seghal's composition in the same manner as claimed by applicants would read on and result the same wherein, a sacrificial silicon-containing layer etching composition, comprising a supercritical fluid (SFC), at least one co-solvent, at least one etchant species, at least one non-ionic surfactant, where the etchant species comprises at least one bifluoride compound selected from the group consisting of ammonium bifluoride and tetra-alkylammonium bifluoride R₄NHF₂ and optionally at least one surfactant as in claim 1.

As to claim 7, Seghal discloses silicon-containing species selected from the group consisting of silicon oxide and silicon nitride (paragraph 0021).

As to claims 5 and 6, Seghal discloses that co-solvent comprises methanol (paragraph 0023, 0026, 0046), isopropanol/isopropyl alcohol (paragraph 0017 and paragraph 0050).

As to claim 7, Seghal discloses the sacrificial silicon containing layer comprises silicon oxide (paragraph 0087)

As to claim 11, Seghal discloses anionic and non-ionic surfactants (paragraph 0060) such as propylene glycol; carboxylic acid salts (paragraph 0107).

As to claim 14, Seghal discloses the sacrificial silicon-containing layers consist essentially of silicon (paragraph 0021).

As to claims 41 and 42, Seghal discloses the SCF is carbon dioxide, argon (paragraph 0025).

Claim Rejections - 35 USC § 103

2. Claims 12-13 are rejected under 35 U.S.C. 103(a) over Seghal (US Pub. No. 2004/0050406) as applied to claim 1 in further view of Wilkinson (US Patent No. 5,789,505).

As to claim 12, Seghal is silent the acetylenic diol in the composition. However, Wilkinson discloses acetylenic alcohol and diols in the SCF (col.3, lines 18-21, col.4, and lines 44-49). Wilkinson also teaches 0.01 to 30 wt% of acetylene diol in CO₂ (col.4, lines 61-63). Hence, one can conclude the balance of CO₂ ranges from 99.09 to 70 wt%. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Seghal's composition by employing a surfactant as taught by Wilkinson for the purpose of using a material that is environmentally friendly.

As to claim 13, the combined reference of Seghal and Wilkinson discloses the etching compositions of SCCO₂ (99-70 wt%), co-solvents (10-30 wt%) (Table II in Seghal), etchant species (5-10wt%) (Table II in Seghal), surfacatants (0.01 to 30Wt% in Wilkinson (col.4, lines 61-63). One who is skilled in the art at the time of the invention was made should be able to select any proportion of wt% of components in the combined reference of Sehgal and Wilkinson because the wt% is considered a result effective variable that can be optimized by routine experimentation for the purpose of obtaining the disclosed composition.

Response to Arguments

3. Applicant's arguments filed on 9/13/2007 have been fully considered but they are not persuasive.

Applicants' arguments on page 10-11 of the reply asserting that the primary reference of Sehgal relates to the removal of organic materials such as photoresist without attacking inorganic materials such as low films on the semiconductor device structure are not convincing. Sehgal discloses that the supercritical fluid carries the co-solvents into contact with the substrate and into high aspect vias, allowing the co-solvents to strip the photoresist/residues (paragraph 0023. If the supercritical fluid and co-solvents and other surfactants come into contact with the substrate, one who is skilled in the art at the time of the invention was made should be able to employ the composition disclosed by Sehgal to attack low-k dielectrics such as SiO_2 or any other material by varying the concentration of the composition (paragraph 0024).

Sehgal discloses co-solvent that includes branched C1-C6 alcohol (paragraphs 0017, 0023, 0029). Therefore, one who is skilled in the art at the time of invention should be able to combine the teachings of Sehgal and Wilkinson to meet all the limitation of applicants' independent claim 1 and 39.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maki A. Angadi whose telephone number is 571-272-8213. The examiner can normally be reached on 8 AM to 4.30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on 571-272-1465. The

fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Dr. Maki Angadi
Examiner
Art Unit 1792.

LAN VINH
PRIMARY EXAMINER

